IN THE SPECIFICATION

A. Please delete paragraph [0049] in its entirety.

B. Please amend the following paragraphs as indicated:

[0050] Figures [[15A-D]] 14A-B are top and sectional views of another embodiment of a conductive article;

[0051] Figures [[16-18]] 15-17 are a sectional view of alternate embodiments of a conductive article;

[0052] Figure [[19]] 18 is sectional view of another embodiment of a conductive article having one embodiment of a ball assembly; and

[0053] Figures [[20A-B]] 19A-B are side and exploded views of the ball assembly of Figure [[19]] 18;

[0054] Figure [[21]] 20 is one embodiment of a contact element of the ball assembly of Figures [[19 and 20A-B; and]] 18 and 19A-B;

[0055] Figures [[22-24]] 21-23 are perspective and sectional views of another embodiment of a conductive article having another embodiment of a ball assembly; and

[0204] Figures [[14A-B]] 13A-B are top and sectional views of another embodiment of a conductive article 1400. The conductive article 1400 includes abrasive features extending from a polishing surface 1402 of a conductive portion 1404 of the conductive article 1400. The abrasive features may be abrasive particles as described with reference to Figure 3 above, or

may be discreet abrasive elements 1406 as shown in Figures [[14A-B]] 13A-B.

[0205] In one embodiment, the abrasive elements 1406 are bars received in respective slots 1408 formed in the polishing surface 1402 of the conductive article 1400. The abrasive elements 1406 generally extend from the polishing surface 1402 and are configured to remove the passivation layer of the metal surface of the substrate being polished, thereby exposing the underlying metal to the electrolyte and electrochemical activity, thereby enhancing the rate of polishing during processing. The abrasive elements 1406 may be formed from ceramic, inorganic, organic, or polymer material strong enough to break the passivation layer formed at the metal surface. An example is a bar or strip made from conventional polishing pad such as polyurethane pad disposed in the conductive article 1400. In the embodiment depicted in Figures [[14A-B]] 13A-B, the abrasive elements 1406 may have hardness of at least about 30 Shore D, or hard enough to abrade the passivation layer of the material being polished. In one embodiment, the abrasive elements 1406 are harder than copper. Polymer particles may be solid or spongy to tailor the wear rate of the abrasive elements 1406 relative to the surrounding conductive portion 1404.

[0208] Figures [[15A-D]] 15A-D are top and sectional views of alternative embodiments of a conductive article 1500. The conductive article 1500 includes conductive rollers 1506 extending from a polishing surface 1502 of an upper portion 1504 of the conductive article 1500. The rollers 1506 can be urged down to the same plane of the polishing surface 1502 by substrate during polishing. The conductive rollers embedded in the conductive article 1500 are coupled to an external power source 1536 at high voltage for high removal rate of bulk polishing substrate during processing.

[0210] In the embodiment depicted in Figure [[15B]] 14B, the conductive rollers 1506 are plurality of balls disposed in one or more conductive carriers 1520. Each conductive carrier 1520 is disposed in a slot 1508 formed in the polishing surface 1502 of the conductive article 1500. The conductive rollers 1506 generally extend from the polishing surface 1502 and are configured to provide electrical contact with the metal surface of the substrate being polished. The conductive rollers 1506 may be formed from any conductive material, or formed from a core 1522 at least partially coated with a conductive covering 1524. In the embodiment depicted in Figure [[15B]] 14B, the conductive rollers 1506 have a polymer core 1522 at least partially covered by a soft conductive material 1524. An example is a TORLON™ polymer core coated with conductive gold layer using copper as seeding layer between TORLON™ and gold layer. Another example is TORLON™ or other polymer core coated with a layer of copper or other conductive material. Other soft conductive materials 1524 include, but are not limited to, silver, copper, tin and the like.

[0210] In the embodiment depicted in Figure [[15B]] 14B, a resilient member 1510 may be disposed in the respective slots 1508 between the conductive carriers 1520 and the conductive portion 1504. The resilient member 1510 allows the conductive rollers 1506 (and carrier 1520) to move relative to the conductive portion 1504, thereby providing enhanced compliance to the substrate for more uniform electrical contact during polishing.

[0211] In the embodiment depicted in Figure [[15C]] 14C, the conductive rollers 1506 are respectively disposed in a plurality of electrically insulative housings 1530 that are coupled to the disc 206. Each housing 1530 may be coupled to the disc 206 by welding, adhesives, staking or other methods. In the embodiment depicted in Figure 7C, the housings 1530 are threaded into the disc 206.

[0221] In the embodiment depicted in Figure [[15C]] 14C, the pad assembly 1540 includes a dielectric layer 1550, a subpad 1552 and an electrode 1554. The dielectric layer 1550, the subpad 1552 and the electrode 1554 may be coupled together as a replaceable unit, for example by compression molding, staking, fastening, adhering, bonding or by other coupling methods.

[0213] A second set of apertures 1544 (one of which is shown in Figure [[FC]] 14C) may be formed at least through the dielectric layer 1550 through at least the dielectric layer 1550 and the subpad 1552 to allow electrolyte disposed on the pad assembly 1540 to provide a current path between the electrode 1554 and the substrate 114. Optionally, the apertures 1544 may extend into or through the electrode 1554. A window (not shown) may also be formed in the pad assembly 1540 as described above with reference to Figure 7F to facilitate process control.

[0214] In the embodiment depicted in Figure [[15D]] 14D, a pad assembly 1560 includes at least a conductive layer 1562, a subpad 1564 and an electrode 1554. The conductive layer 1562, the subpad 1564 and the electrode 1554 may be coupled together as a replaceable unit. The pad assembly 1560 may include first apertures 1570 configured to accept the housing 1530 and second apertures 1572 to allow electrolyte disposed on the pad assembly 1560 to establish a current path between the substrate 114 and the electrode 1554. A window (not shown) may also be formed in the pad assembly 1560 as described above

[0228] Figure [[16]] 15 is a sectional view of another embodiment of a conductive article 1600. The conductive article 1600 generally includes a conductive portion 1602 adapted to contact a substrate during polishing, an article support portion 1604 and an interposed pad 1606 sandwiched between

the conductive portion 1602 and the article support portion 1604. The conductive portion 1602 and article support portion 1604 may be configured similar to any of the embodiments described herein or their equivalent. A layer of adhesive 1608 may be provided on each side of the interposed pad 1606 to couple the interposed pad 1606 to the article support portion 1604 and the conductive portion 1602. The conductive portion 1602, the article support portion 1604 and the interposed pad 1606 may be coupled by alternative methods thereby allowing the components of the conductive article 1600 to be easily replaced as a single unit after its service life, simplifying replacement, inventory and order management of the conductive article 1600.

[0234] Figure [[17]] 16 is sectional view of another embodiment of a conductive article 1700. The conductive article 1700 generally includes a conductive portion 1602 adapted to contact a substrate during polishing, a conductive backing 1610, an article support portion 1604 and an interposed pad 1706 sandwiched between the conductive portion 1602 and the article support portion 1604, having similar construction to the conductive article 1600 described above.

[0235] In the embodiment depicted in Figure [[17]] 16, the interposed pad 1706 is fabricated from a material having a plurality of cells 1708. The cells 1708 are generally filled with air or other fluid, and provide a resiliency and compliance that enhances processing. The cells may be open or closed with a size ranging from 0.1 micron meter to several millimeters such as between 1 micron meter to 1 milimeter. The invention contemplates other sizes applicable for interposed pad 1706. The interposed pad 1706 may be at least one of permeable or perforated to allow electrolyte to flow therethrough.

[0237] Figure [[18]] 17 is sectional view of another embodiment of a conductive article 1800. The conductive article 1800 includes a conductive portion 1802 coupled to an article support portion 1804. Optionally, the

conductive article 1800 may include an interposed pad and conductive backing (both not shown) disposed between the conductive portion 1802 and the article support portion 1804.

[0244] Figure [[19]] 18 is a partial sectional view of another embodiment of an ECMP station 1990 and Figures [[20A-B]] 19A-B are side and exploded views of a ball assembly 1900 of the ECMP station 1990 of Figure [[19]] 18. The ECMP station 1990 includes a platen 1950 that supports a polishing pad assembly 1960 on which a substrate 114 retained in a polishing head 130 is processed. The platen 1950 includes at least one ball assembly 1900 projecting therefrom and coupled to a power source 1972 that are adapted to bias a surface of the substrate 114 during processing. Although two ball assemblies 1900 are shown in Figure [[19]] 18, any number of ball assemblies may be utilized and may be distributed in any number of configurations relative to the centerline of the platen 1950.

[0249] In the embodiment depicted in Figures [[19-20A-B]] 18-19A-B and detailed in Figure [[21]] 20, the contact element 1914 includes an annular base 1942 having a plurality of flexures 1944 extending therefrom in a polar array. The flexure 1944 includes two support elements 2102 extending from the base 1942 to a distal end 2108. The support elements 2102 are coupled by a plurality of rungs 2104 to define apertures 2110 that facilitate flow past the contact element 1916 with little pressure drop as discussed further below. A contact pad 2106 adapted to contact the ball 1906 couples the support elements 2102 at the distal end 2108 of each flexure 1944. The flexure 1944 is generally fabricated from a resilient and conductive material suitable for use with process chemistries. In one embodiment, the flexure 1944 is fabricated from gold plated beryllium copper.

[0250] Returning to Figures [[19-20B]] 18-19B, the clamp bushing 1916 includes a flared head 1924 having a threaded post 1922 extending therefrom. The clamp busing may be fabricated from either a dielectric or conductive material, and in one embodiment, is fabricated from the same material as the housing 1902. The flared head 1924 maintains the flexures 1944 at an acute angle relative to the centerline of the ball assembly 1900 so that the contact pads 2106 of the contact elements 1914 are positioned to spread around the surface of the ball 1906 to prevent bending, binding and/or damage to the flexures 1944 during assembly of the ball assembly 1900 and through the range of motion of the ball 1906.

[0253] The boss 1934 is received in the second end 1910 of the housing 1902 and provides a surface for clamping the contact element 1914 thereto. The boss 1934 additionally includes at least one threaded hole 2006 disposed on the side of the boss 1934 that engages a fastener 2002 disposed through a hole 2004 formed in the housing 1902, thereby securing the housing 1902 to the adapter 1904 and capturing the ball 1906 therein. In the embodiment depicted in Figure [[20A]] 19A, three fasteners are shown for coupling the housing 1902 to the adapter 1904 through counter-sunk holes 2004. It is contemplated that the housing 1902 and adapter 1904 may be fastened by alternative methods or devices, such as staking, adhering, bonding, press fit, dowel pins, spring pins, rivets and retaining rings, among others.

[0254] The ball 1904 is generally actuated towards the polishing surface 1906 by at least one of spring, buoyant or flow forces. In the embodiment depicted in Figure [[19]] 18, the passages 1936, 1918 formed through the adapter 1904 and clamp busing 1916 are coupled through the platen 1950 to an electrolyte source 1970. The electrolyte source 1970 provides electrolyte through the passages 1936 and 1918 into the interior of the hollow housing 1902. The electrolyte exits the housing 1902 between the seat 1926 and ball

1906, thus causing the ball 1906 to be biased toward the polishing surface 1964 and into contact with the substrate 114 during processing.

[0255] So that the force upon the ball 1906 is consistent across the different elevations of the ball 1906 within the housing 1906, a relief or groove 1928 is formed in the interior wall of the housing 1906 to accept the distal ends (2108 in Figure [[21]] 20) of the flexures 1944 to prevent restricting the flow of electrolyte passing the ball 1908. An end of the groove 1928 disposed away from the seat 1926 is generally configured to being at or below the diameter of the ball 1906 when the ball 1906 is in the lowered position.

[0256] Figures [[22-24]] 21-23 are perspective and sectional views of another embodiment of a conductive article having another embodiment of a ball assembly.

[0257] Figure [[22]] 21 is a perspective view of another embodiment of an ECMP station 2290 and Figures [[23-24]] 22-23 are perspective and partial sectional views of a ball assembly 2200 of the ECMP station 2290 of Figure [[22]] 21. The ECMP station 2290 includes a platen 2250 that supports a polishing pad assembly 2260 (partially shown in Figure [[22]] 21). The platen 2250 includes at least one ball assembly 2200 projecting therefrom and coupled to a power source 1972. The ball assembly 2200 is adapted to electrically bias a surface of the substrate 114 (shown in Figure [[24]] 23) during processing. Although one ball assembly 2200 is shown coupled to the center of the platen 2250 in Figure [[22]] 21, any number of ball assemblies may be utilized and may be distributed in any number of configurations relative to the centerline of the platen 2250.